MULTIMEDIA UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

**TRIMESTER 3, 2016/2017**

## EBT 3026– BIOMETRICS

(BE)

26 MAY 2017
3.00p.m–5.00p.m
(2 Hours)

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**INSTRUCTIONS TO STUDENT**

1. This Question paper consists of 5 pages with 4 Questions only.
2. Answer **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

## Question 1

a) What is a Biometric System?List any four physical attributes and any four behavioral characteristics that make a person stands separate from the rest.

[6 marks]

b) Analyse the graph in Figure 1b and explain the need for alternate identification approach for conventional security methods.

[4 marks]

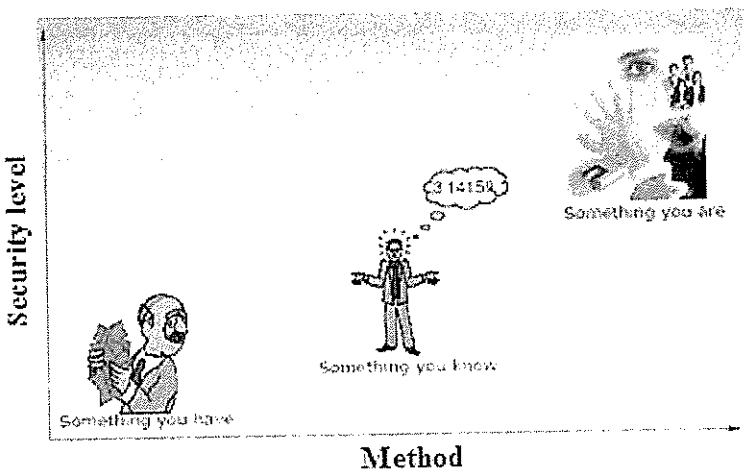


Figure 1b.

c) Suggest any three applications of Biometric Security System in the areas of forensic, government and commercial.

[6 marks]

d) Explain the technology behind the biometric wearable wristband, such as Nymi Band? How is it more convenient to users?

[5 marks]

e) Discuss the potential challenges for the implementation of biometrics in security system.

[4 marks]

**Continued...**

**Question 2**

a) Why should we extract the contour of a given pattern?

[2 marks]

b) Actualy we are wasting the precious computational time by first extracting the contour of a pattern and then collecting its features. Why not collect features directly from the pattern?

[4 marks]

c) Moore-Neighbor tracing is one of the most common and simple contour tracing algorithms.

(i) Describe the idea behind Moore-Neighbor tracing.

[3 marks]

(ii) Convert the idea into a simple algorithm (pseudocode) that can be implemented in any computer language.

[4 marks]

(iii) Draw the path of the bug (ladybird) standing on the start pixel as in Figure 2c, to determine the next pixel of the contour by going around the pattern in a clockwise direction.

[3 marks]

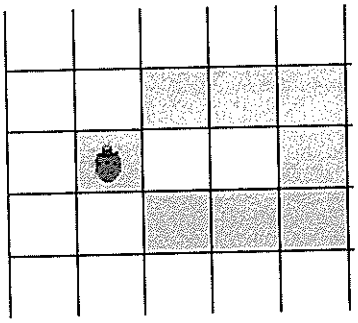

Figure 2c.

(iv) The main weakness of Moore-Neighbor tracing lies in the choice of the stopping criterion. Write the criterion proposed by Jacob Eliosoff to overcome this weakness.

[2 marks]

d) Describe the K-means clustering algorithm that can be used for image segmentation and discuss any two advantages and disadvantages of it.

[5+2 marks]

**Continued...**

## Question 3

a) Let in a university boys = 70% and girls = 30%. Based on this probability, answer to questions like "whether student X is a boy or a girl" is always in favor of BOY. This obviously is not always correct. Suggest a way to make better decision.
Using the information given in the graph of Figure Q3a, determine the probability that the student is a BOY given height = 152cm and the probability that the student is a GIRL given height = 152cm.

[7 marks]

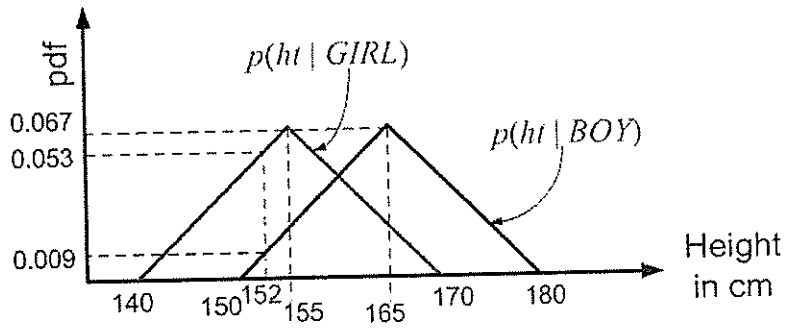


Figure Q3a

b) Though person identification by face is the most common and the most natural means of identification, systems experiencing difficulties in face recognition. Explain such difficulties in terms of intra-class variation and inter-class similarity.

[4 marks]

c) Draw the block diagram of face recognition system and explain briefly about any three kinds of face detection method.

[6 marks]

d) Explain the working principle of voice biometrics. Identify a situation where only voice verification systems can be used.

[5 marks]

e) Write the two useful and unique information good for identification in iris pattern recognition and write any two of their properties that make the identification system very accurate.

[3 marks]

**Continued...**

**Question 4**

a) Identify the steps required to implement alignment based verification type of hand geometry based verification system. Find any two limitations of hand geometry based verification system.

[5 marks]

b) Suggest a suitable classification method to classify the unknown object shown in Figure Q4b and explain how the classification is done. Mention its effectiveness.

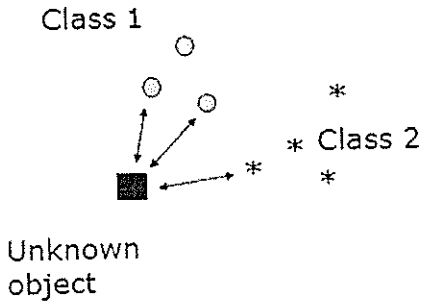


Figure Q4b

[4 marks]

c) What biological principle of fingerprint make it possible for identification? Identify the fingerprint categories formed by the ridges in the Figure Q4c.

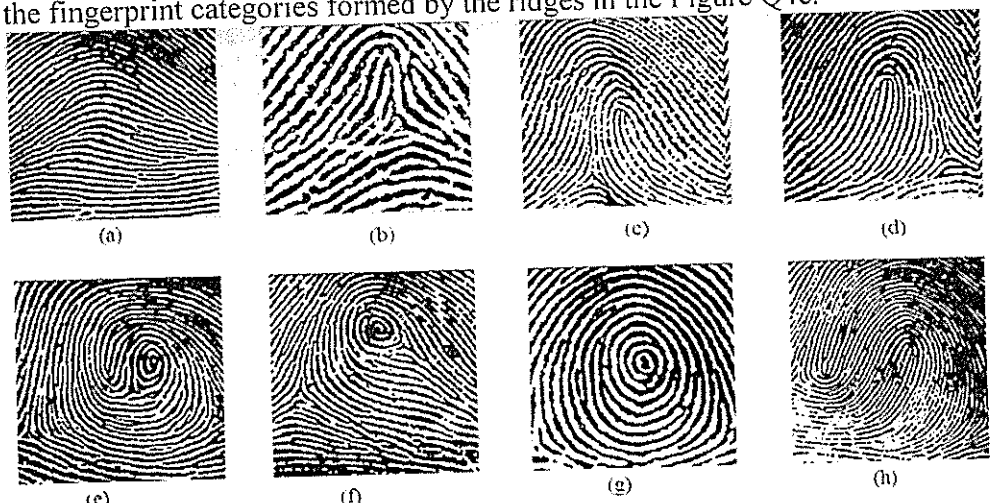


Figure Q4c

[7 marks]

d) Describe the process of minutiae detection and calculation of final matching score in fingerprint recognition.

[5 marks]

e) Explain why DNA-based identification is not good for real time and its use is currently limited to forensic applications.

[4 marks]

**End of Paper**